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CLAIMS

What is claimed is:

1. An audio compressor, comprising:

an audio input coupled to receive audio source material;

an audio level input coupled to receive an audio level signal indicative of a desired audio output level V;

a processor operable to generate a compression ratio having a level inversely proportional to the level of the audio level signal;

a compression stage operable to apply compression to the audio source material in response to the level of the compression ratio; and

an audio output operable to provide a compressed audio signal to an audio gain stage having an output level controlled by the audio level signal.

2. The audio compressor of claim 1, further comprising a noise threshold input coupled to receive a signal indicative of an ambient noise level NT, the processor further operable to adjust the compression ratio in response to the ambient noise level.

3. The audio compressor of claim 1, further comprising a noise threshold input coupled to receive a signal from a vehicle status detector indicative of an ambient noise level in the vehicle, the processor further operable to adjust the compression ratio in response to the ambient noise level.

4. The audio compressor of claim 3, the vehicle status detector comprising at least one of a velocity sensor, a window state sensor, a sun roof state sensor and a top state sensor.

5. The audio compressor of claim 1, further comprising an effects level input coupled to receive an effects level signal EL from a user-adjustable control, the processor further operable to adjust the compression ratio in response to the effects level signal.

6. The audio compressor of claim 5, wherein the effects level signal has a range from 0% to at least 100%, wherein:

an effects level of 0% results in no compression being applied to the audio source material;

an effects level of 100% results in a predetermined full amount of compression being applied to the audio source material; and

an effects level greater than 100% results in an excessive amount of compression being applied to the audio source material.

7. The audio compressor of claim 1, further comprising a program dynamic range input coupled to receive a program dynamic range PDR indicative of a dynamic range of the audio source material, the processor further operable to adjust the compression ratio in response to the program dynamic range.

8. The audio compressor of claim 7, wherein the received program dynamic range is one of a plurality of user-selectable program dynamic ranges.

9. The audio compressor of claim 7, wherein the received program dynamic range is transmitted from a program dynamic range detector operable to determine the program dynamic range of the audio source material.

10. The audio compressor of claim 1, wherein the processor generates the compression ratio as:

1+(PDR/V-NT)-1)*EL if (NT+PDR)> V; and

1 if (NT+PDR) =< V;

where NT is an ambient noise threshold, PDR is a program dynamic range level and EL is an effects level having a range from 0% to at least 100%.

11. The audio compressor of claim 1, wherein the audio output is operable to provide a compressed audio signal to a makeup gain stage interposed between the compressor

and the audio gain stage, a gain of the makeup gain stage being increased in direct proportion to the amount of compression applied to the audio source material.

11. An audio amplifier, comprising:

an audio input coupled to receive audio source material having a signal level Input;

a user-adjustable volume control operable to generate an audio level signal V indicative of a desired audio output level;

an audio level input coupled to receive the audio level signal;

an adjustable compression control, coupled to the volume control and operable to generate a compression ratio signal in inverse proportion to the audio level signal;

means for applying compression to the audio source material in response to the level of the compression ratio signal and outputting a compressed audio signal; and

an audio gain stage, coupled to the compression means and the volume control, operable to adjust a gain of the compressed audio signal in response to the audio level signal.

12. The audio amplifier of claim 11, further comprising:

means for generating a noise threshold signal NT indicative of the ambient noise level; and

means for adjusting the compression ratio in response to the noise threshold signal.

13. The audio amplifier of claim 11, further comprising:

a user-adjustable effects level control having an output with a range from 0% to at least 100%; and

means for adjusting the compression ratio in response to the output of the effects level control, wherein:

an effects level of 0% results in no compression being applied to the audio source material;

an effects level of 100% results in a predetermined full amount of compression being applied to the audio source material; and

an effects level greater than 100% results in an excessive amount of compression being applied to the audio source material.

14. The amplifier of claim 11, further comprising a makeup gain stage interposed between the compressor and the audio gain stage and having an output level which is increased in direct proportion to the amount of compression applied to the audio source material.

15. The amplifier of claim 11, further comprising:

a program dynamic range control operable to determine a program dynamic range PDR of the audio source material; and

means for adjusting the compression ratio in response to the program dynamic range.

16. The audio compressor of claim 15, the program dynamic range control comprising user-operable means for selecting one of a plurality of program dynamic ranges.

17. The audio compressor of claim 15, the program dynamic range control comprising means for determining the program dynamic range from the audio source material.

18. The amplifier of claim 11, further comprising:

an ambient level detector, comprising means for generating a noise threshold signal NT indicative of the ambient noise level;

means for adjusting the compression ratio in response to the noise threshold signal;

a user-adjustable effects level control having an output EL with a range from 0% to at least 100%;

means for adjusting the compression ratio in response to the output of the effects level control, wherein:

an effects level of 0% results in no compression being applied to the audio source material;

an effects level of 100% results in a predetermined full amount of compression being applied to the audio source material; and

an effects level greater than 100% results in an excessive amount of compression being applied to the audio source material;

a program dynamic range control operable to determine a program dynamic range PDR of the audio source material;

means for adjusting the compression ratio in response to the program dynamic range; and

a makeup gain stage interposed between the compressor and the audio gain stage and having an output level which is increased in direct proportion to the amount of compression applied to the audio source material.

19. The amplifier of claim 18, wherein:

the compression ratio is:

1+(1/V-NT)-1)*EL if NT > V; and

1 if NT =< V; and

the output level of the audio gain stage is:

Thresh + (Input - Thresh)/Ratio + MakeupGain + V, if Input > Thresh; and

Input + MakeupGain + V, if Input <= Thresh;

where Thresh is a threshold level below which no compression is applied.

20. The amplifier of claim 11, wherein the volume control and the compression control each comprise one portion of a dual-potentiometer.

21. A method of applying compression to audio source material, comprising:

adjusting a volume control level V to affect the gain of an output of an audio amplifier;

dynamically adjusting a compression ratio in response to the volume control level and in inverse proportion thereto;

receiving audio source material in the audio amplifier; and

applying compression to the audio source material in an amount determined by the compression ratio.

22. The method of claim 21, further comprising adjusting the compression ratio in response to an ambient noise level.

23. The method of claim 22, wherein the ambient noise level is measured inside a vehicle.

23B. The method of claim 23, wherein the ambient noise level is detected by at least one sensor measuring a noise generating characteristic of the vehicle.

23C. The method of claim 23, wherein the ambient noise level is measured by at least one of a velocity sensor, a window state sensor, a sun roof state sensor and a top state sensor.

24. The method of claim 21, further comprising, adjusting the compression ratio in response to a received effects level signal.

25. The method of claim 22, wherein the effects level signal has a range from 0% to at least 100%, and wherein:

an effects level of 0% results in no compression being applied to the audio source material;

an effects level of 100% results in a predetermined full amount of compression being applied to the audio source material; and

an effects level greater than 100% results in an excessive amount of compression being applied to the audio source material.

26. The method of claim 21, further comprising adjusting the compression ratio in response to a program dynamic range of the audio source material.

27. The method of claim 26, further comprising selecting the program dynamic range from a plurality of user-selectable program dynamic ranges.

28. The method of claim 26, further comprising dynamically determining the program dynamic range of the audio source material from the audio source material.

29. The method of claim 21, further comprising applying a makeup gain to the compressed audio source material directly proportion to the compression ratio.

30. The method of claim 21, further comprising:

adjusting the compression ratio in response to an ambient noise level NT;

adjusting the compression ratio in response to a received effects level signal EL;

adjusting the compression ratio in response to a program dynamic range PDR of the audio source material; and

applying a makeup gain to the compressed audio source material directly proportion to the compression ratio.

31. The method of claim 30, wherein:

the compression ratio is:

1+(1/V-NT)-1)*EL if NT > V; and

1 if NT =< V; and

the output level of the compressed audio is:

Thresh + (Input - Thresh)/Ratio + MakeupGain + V, if Input > Thresh; and

Input + MakeupGain + V, if Input <= Thresh;

where Thresh is a threshold level below which no compression is applied.

32. An audio compressor, comprising:

an audio input coupled to receive audio source material;

an audio level input coupled to receive an audio level signal indicative of a desired audio output level V;

a processor operable to generate a compression ratio having a level inversely proportional to the level of the audio level signal;

a compression stage operable to apply compression to the audio source material in response to the level of the compression ratio;

a makeup gain stage coupled to receive a compressed audio signal from the compression stage and having a gain which is increased in direct proportion to the amount of compression applied to the audio source material; and

an audio output coupled to receive a compressed, gain-adjusted audio signal from the makeup gain stage and operable to provide a processed audio signal to an audio gain stage having an output level controlled by the audio level signal.

33. The audio compressor of claim 32, further comprising a noise threshold input coupled to receive a signal indicative of an ambient noise level NT, the processor further operable to adjust the compression ratio in response to the ambient noise level.

34. The audio compressor of claim 32, further comprising a noise threshold input coupled to receive a signal from a vehicle status detector indicative of an ambient noise level in the vehicle, the processor further operable to adjust the compression ratio in response to the ambient noise level.

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35. The audio compressor of claim 34, the vehicle status detector comprising at least one of a velocity sensor, a window state sensor, a sun roof state sensor and a top state sensor.

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36. The audio compressor of claim 32, further comprising an effects level input coupled to receive an effects level signal EL from a user-adjustable control, the processor further operable to adjust the compression ratio in response to the effects level signal.

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37. The audio compressor of claim 36, wherein the effects level signal has a range from 0% to at least 100%, wherein:

an effects level of 0% results in no compression being applied to the audio source material;

an effects level of 100% results in a predetermined full amount of compression being applied to the audio source material; and

an effects level greater than 100% results in an excessive amount of compression being applied to the audio source material.

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38. The audio compressor of claim 32, further comprising a program dynamic range input coupled to receive a program dynamic range PDR indicative of a dynamic range of the audio source material, the processor further operable to adjust the compression ratio in response to the program dynamic range.

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39. The audio compressor of claim 38, wherein the received program dynamic range is one of a plurality of user-selectable program dynamic ranges.

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40. The audio compressor of claim 38, wherein the received program dynamic range is transmitted from a program dynamic range detector operable to determine the program dynamic range of the audio source material.

41. The audio compressor of claim 32, wherein the processor generates the compression ratio as:

1+(PDR/V-NT)-1)*EL if (NT+PDR)> V; and

1 if (NT+PDR) =< V;

where NT is an ambient noise threshold, PDR is a program dynamic range level and EL is an effects level having a range from 0% to at least 100%.

42. The audio compressor of claim 32, comprising a downward compressor.